

February 24, 2020

MEMORANDUM

SUBJECT: Review of the Draft Final Remedial Investigation Report for Homestake Uranium Superfund Site. Baseline Human Health Risk Assessment Section.

FROM: Ghassan A. Khoury, MSPH, Sc.D.  
Risk and Site Assessment Section (SEDAS)

TO: Mark Purcell, RPM  
LA/NM/OK Remedial Section (SEDRL)

I reviewed the BHHRA section of the Draft final RI report for Homestake Uranium Superfund site and the following are my comments:

1) Page 5-5 Section 5.2.1.4 last paragraph

It was reported that “In addition, groundwater remedies approved and monitored by EPA will remove contamination from groundwater at the LTAs.”

Please change the word “remove” with “reduce”.

2) Page 5-6 Section 5.2.1.5 2<sup>nd</sup> Bullet

It is reported that “. Inhalation of spray or mist from the ponds is not addressed because air data are used to evaluate inhalation exposure.”

I thought the practice of spraying pond water in the air was halted.

3) Page 5-6 Section 5.2.1.5 3<sup>rd</sup> Bullet

It is explained that Pond sediment is the solids at the bottom of the pond and then talk about the low risk from white residues around the ponds. Please provide risk to a trespasser that accidentally come into contact with pond water and include risk from exposure to pond sediment (the solids at the bottom of the pond).

4) Page 5-13 Section 5.2.2.2.3 Sediment

Sediment is here referred to as evaporite. Please make a distinction between sediment white residue at the banks of the pond and sediment at the bottom of the pond.

5) Page 5-14 Section 5.2.2.2.3 Sediment

It is reported that “There are sediment data from two samples. One sample was collected from the West Collection Pond and was analyzed for uranium natural (U-nat) and Th-230. The other sample was collected at EP1 and analyzed for Ra-226. Soil Rad PRGs (Table 5-4) were used to initially screen sediments. The sediment samples evaluated in the risk assessment were collected on September 24, 2015 (ERG 2017).”

Please provide distinction between sediment found around the banks of the ponds discussed earlier in this section and this section referring to sediments found at the bottom of the ponds. Refer to the table which contain the results of the sediment at the bottom of the pond.

6) Page 5-23 Sediment Section

Please provide a distinction that the two sediment samples were collected from the bottom of the ponds to represent ponds bottom sediments.

7) Page 5-33 Section 5.2.3.6 2<sup>nd</sup> paragraph

It is reported that “For evaluating potential exposure, surface and subsurface soil data were combined.”

This is true only for construction worker which is assumed to be involved in digging into the soil. For composite worker or trespasser use surface soil concentrations only.

8) Page 5-34 2<sup>nd</sup> paragraph 3<sup>rd</sup> bullet

It is reported that “If the UCL95 could not be calculated for a detected analyte because the sample size was too low (that is, less than 8), or the number of detections was less than 6, the median value was used as the EPC.”

It is reported earlier that if the UCL95 could not be calculated because of few samples then the maximum value is used (see table 5-10) . If there are 3 detected values but less than 6 detected values and total samples less than 8 then use the arithmetic mean. Use the median if data is skewed.

9) Page 5-35 last paragraph last sentence.

It was reported that “Volatile chemicals such as radon (Rn-222) that behave according to Henry’s Law can emanate from water or soil into air and can then be inhaled. Shower models were considered too conservative for prediction of outdoor air exposure due to emissions of radon from the ponds. This pathway is addressed in the uncertainty analysis because radon in water data were not available.”

Onsite radon samplers should have captured radon gas that emanated from both soil and water.

10) Page 5-56 Table 5-20 and Page 5-60 Table 5-21

It seems that COPC or ROPC were compared to background to decide whether a chemical is retained or removed from further risk evaluation. Comparison to background should not be a basis to eliminate or retain COPC or ROPC. Risk from background COPC or ROPC need to be addressed and discussed in the risk characterization section of the risk assessment. Please follow the Role of Background Guidance in Risk Assessment (April 2002).

11) Page 5-64

It is reported that “Risks due to radon, once background is accounted for, are  $1 \times 10^{-2}$ , which is above the risk management range but similar to background. The Site indoor air concentration of 1837 pCi/m<sup>3</sup> is less than the reported background for Cibola County identified by EPA’s radon map of 2-4 pCi/L (2000 to 4000 pCi/m<sup>3</sup>).”

-Please provide the risk from radon exposure before background is removed and after it was removed. The risk from radon inhalation was not similar to background risk .

-The EPA’s Map of Radon Zones is intended to help governments and other organizations target risk reduction activities and resources. EPA recommends that this map be supplemented with any available local data in order to further understand and predict the radon potential for a specific area. It is not intended to show levels of background in those areas. EPA in its risk assessment report for the residential areas nearby the site, collected 28 indoor air radon levels from Bluewater Village area. The 95% UCL on the arithmetic mean of indoor air radon levels was estimated at 1.97 rounded off to 2.0 pCi/L. We recommend using 2.0 pCi/L as an indoor air radon background level for that area.

12) Page 5-66 Section 5.2.5.2.3 2<sup>nd</sup> to the last paragraph

It is reported that “Uranium activity was not modeled from mass concentrations in surface water because there are significant uncertainties in estimating activity due to uranium isotopes in water from mass concentrations because of isotopic solubility differences. This may bias surface water risk low.”

Do we know why surface pond water was not tested for U-234 and U238? There is a conversion factor from mass to activity for Uranium in water. Total Uranium concentration in surface water was given as 548.8 mg/L. Please apply the conversion factor to get total uranium concentrations in pCi/L.

13) Page 5-69 Table 5-23, Page 5-71 Table 5-25 , Page 5-74 Table 5-27 and Page 5-78 Table 5-30

ROPC were not included in the risk evaluation since they were eliminated based on comparison with background levels. If Risk Ratio is  $> 1$  and Background levels is less than site levels, ROPC need to be retained and evaluated in these tables. Their risk contribution can then be added to the risk from Inherent Background levels. Please adjust and include in the text explaining the risk numbers.

14) Page 5-74 Table 5-27

Please adjust the heading to read Cancer and take out the Hazard Quotient

15) Page 5-78 Table 5-28

Include total uranium in pond water and use conversion factor to convert mg/L to pCi/L.

16) Page 5-81 Table 5-32, Page 5-83 Table 5-34 and Page 5-85 Table 5-36

Only 3 ROPC in soil were retained for risk evaluation. Need to retain ROPC in soil background if RR is >1.

17) Page 5-87 Section 5.2.5.2.7 Post Remedy Drinking Water Risk Evaluation

There is no need to evaluate risk with cleanup levels set at their MCL values. However, for COPC or ROPC set at levels greater than their MCL, risk must be evaluated at their proposed cleanup level. In Homestake case uranium cleanup level was set at 160 µg/L when the MCL is set at 30 µg/L and selenium cleanup level was set at 320 when the MCL value is set at 50 µg/L. A waiver is usually requested to set cleanup level above their respective MCL values. Please see OSWER Directive 9283.1-33 Jun. 26, 2009 (Summary of Key Existing EPA CERCLA Policies for Groundwater Restoration).

A worker scenario was used in evaluating risk from groundwater exposures. When evaluating risk from exposure to groundwater, land use is not identified as a consideration in making groundwater classification. Groundwater classified as either Class I or II, they are considered potable water and should be returned to its beneficial use. EPA regional screening level uses residential scenarios to evaluate risk from tap water exposures.

Clean up level for Thorium-230 (Th-230) was set at 0.3 pCi/L. But on page 3-14 Table 3-12, the NRC License Cleanup level was reported at 0.03 pCi/L. Please explain the discrepancy in the numbers.

The MCL value for Ra-226 and Ra-228 combined is given at 5 pCi/L. There is no need to evaluate risk of ROPC at their MCL values.

Additional Comment:

Page 3-30 and 3-31 Table 3-24

It is reported that “As can be seen, the regulatory limit of 20 pCi/m<sup>2</sup>s was exceeded in 2016-2018. In 2017, Homestake requested a variance from the flux standard for the top of the LTP as existing groundwater treatment and monitoring wells prevent placement of final radon barrier. In addition, dose assessment modeling indicates that a variance would not result in exceedances of public dose limits (HMC 2017).”

Please provide the response from NRC on Homestake request for a variance from the flux standard for the top of the LTP.